







### 3. REQUIREMENTS

#### 3.1 SURFACE PREPARATION

3.1.1 Cleaning. Surfaces to be bonded shall be cleaned prior to bonding to eliminate grease, dirt, and any other deleterious contaminants which would adversely affect the application and performance of the adhesive. Surfaces shall be cleaned using chemical or mechanical methods as specified in drawing or order, or those which will not have a deleterious effect on the serviceability of the part or subsequent processing.

3.1.2 Finishing. Contact surfaces shall be processed to remove excessive burrs, waves, or other surface imperfections which would adversely affect the serviceability of the bonded parts. Special surface preparation, such as metal priming, shall be performed as specified in the drawing or order.

#### 3.2 BONDING

3.2.1 Mixing. The adhesives shall be mixed in the activator to adhesive mixing ratios specified in Table I.

TABLE I  
ACTIVATOR-ADHESIVE MIXING RATIOS

ADHESIVE TYPE	MIXING RATIO (phw of activator to 100 phw of adhesive)
Type I	100:5

3.2.2 Pot Life. The mixed adhesives shall be used within the pot life limits specified in Table II when a quantity of 10 grams, or less, is used (see 5.2).

TABLE II  
POT LIFE

ADHESIVE TYPE	POT LIFE (max. at 70°F)
Type I	20 min

3.2.3 Application. Unless otherwise specified in the drawing or order, the adhesive shall be applied in a thin, even film to both surfaces to be bonded.

3.3 CURING. Unless otherwise specified in the drawing or order, the adhesive shall be cured in accordance with one of the curing schedules shown in Table III. The bonded assemblies shall not be moved or disturbed before completion of the undisturbed cure time; the assemblies may be moved after this time but shall not be severely stressed until completion of the full cure time (see 6.3). Unless otherwise specified, ambient curing should be used; high temperature curing shall not be used for materials which would be detrimentally affected by high temperatures.

TABLE III  
CURING SCHEDULE

ADHESIVE TYPE	CURE TEMPERATURE (°F)	CURE TIME		BOND PRESSURE (psi)
		Undisturbed	Full	
Type I	Ambient	18 hr	6 days	Good Contact
	150°-160°F	120 min	120 min	Good Contact
	170°-180°F	90 min	90 min	Good Contact
	190°-200°F	45 min	45 min	Good Contact

3.4 APPEARANCE. Bonded assemblies shall show complete adhesion in the bonded areas; there shall be no flaws or indication of lack of adhesion in the bonded areas. All excess adhesive shall be removed from the edges of the bond except where such excess is permitted by the drawing or order. The parts shall not exhibit improper positioning or alignment.

3.5 WORKMANSHIP. The process covered by this specification shall be performed in a manner consistent with quality standards and in accordance with the requirements of this specification.



















APOLLO G&N Specification  
 ND-1002187 G  
 December 5, 1965  
 Class A Release  
 TDRR 04898

WORKING SPECIFICATION  
 ADHESIVE BONDING OF NON-RUBBER PARTS

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
4/21/65	A	10021	1, 2, 3	WK	WJR
11-2-65	B	10047	1, 2, 3	WK	-----
2/9/67	C	10056	3	MGM-EA	---

This specification consists of page 1 to III and I to 4 inclusive.

- c. The containers shall be marked by means of a tag, label, or color code to indicate the date of mixing or expiration date, and to identify the adhesive.
- d. The closed containers with mixed adhesive shall be placed in a freezing compartment at a temperature of  $-50^{\circ}\text{F}$  or lower.
- e. The frozen adhesive shall be warmed to room temperature before opening the container to prevent the condensation of moisture on the adhesive.
- f. The frozen adhesive shall be used within one month after the date of mixing and freezing. All frozen adhesive remaining after one month from the date of mixing shall be discarded.

**3.2.3 Application.** Unless otherwise specified in the drawing or order, the adhesive shall be applied in a film, even film to both surfaces to be bonded.

**3.3 CURING.** Unless otherwise specified in the drawing or order, the adhesive shall be cured in accordance with one of the curing schedules shown in Table III. The bonded assemblies shall not be moved or disturbed before completion of the undisturbed cure time; the assemblies may be moved after this time but shall not be severely stressed until completion of the full cure time (see 6.2). Unless otherwise specified, ambient curing should be used; high temperature curing shall not be used for materials which would be detrimentally affected by high temperatures.

TABLE III  
CURING SCHEDULE

ADHESIVE TYPE	CURE TEMPERATURE ( $^{\circ}\text{F}$ )	CURE TIME		BOND PRESSURE (psi)
		Undisturbed	Full	
Types I, II & III	Ambient	16 hr	6 days	Good Contact
	$150^{\circ} \pm 5^{\circ}\text{F}$	120 min	120 min	Good Contact
	$170^{\circ} \pm 5^{\circ}\text{F}$	90 min	90 min	Good Contact
	$200^{\circ} \pm 5^{\circ}\text{F}$	45 min	45 min	Good Contact
	$135^{\circ} \pm 5^{\circ}\text{F}$	2-3/4 hr min	2-3/4 hr min	Good Contact
	$180^{\circ} \pm 5^{\circ}\text{F}$	75 minutes, min	75 minutes, min	Good Contact

**3.4 APPEARANCE.** Bonded assemblies shall show complete adhesion in the bonded areas; there shall be no flaws or indication of lack of adhesion in the bonded areas. All excess adhesive shall be removed from the edges of the bond except where such excess is permitted by the drawing or order. The parts shall not exhibit improper positioning or alignment.

**3.5 WORKMANSHIP.** The process covered by this specification shall be performed in a manner consistent with quality standards and in accordance with the requirements of this specification.